

What is claimed is:

1. A fuel cell comprising:

a porous insulating film;

5 a plurality of power generation units including a pair of adjacent power generation units, said power generation units each including a first electrode facing said porous insulating film, a second electrode, and an electrolyte interposed between said first electrode and said second electrode;

10 a first electrically conductive film electrically connected to said first electrode of one of said adjacent power generation units, and extending in parallel to said first electrode; and

15 a second electrically conductive film electrically connected to said second electrode of the other of said adjacent power generation units, and extending in parallel to said second electrode,

20 wherein said first electrically conductive film or said second electrically conductive film has an expansion between said adjacent power generation units for connecting said first electrically conductive film and said second electrically conductive film.

25 2. A fuel cell according to claim 1, wherein said first electrically conductive film is arranged in a substantially same plane with a gas diffusion layer of said first

electrode, and said second electrically conductive film is arranged in a substantially same plane with a gas diffusion layer of said second electrode.

5 3. A fuel cell according to claim 1, wherein said first electrically conductive film is made of metal, and said second electrically conductive film is made of composite material of resin and electrically conductive material.

10 4. A fuel cell according to claim 1, wherein said first electrically conductive film is made of composite material of resin and electrically conductive material, and said second electrically conductive film is made of metal.

15 5. A fuel cell according to claim 1, wherein a film having windows is laminated on said porous insulating film such that said first or second electrodes of said power generation units are disposed in said windows.

20 6. A fuel cell according to claim 1, wherein a reactant gas supply passage and a reactant gas discharge passage extend through an end of said fuel cell.

7. A fuel cell, comprising:

25 power generation units each including first and second electrodes and an electrolyte interposed between said first and second electrodes, said first electrode including a

first electrically conductive gas diffusion layer and said second electrode including a second electrically conductive gas diffusion layer, said power generation units including a first power generation unit and a second power generation unit adjacent to said first power generation unit,

5 wherein said first electrically conductive gas diffusion layer of said first electrode of said first power generation unit has a first end protruding toward said second power generation unit;

10 said second electrically conductive gas diffusion layer of said second electrode of said second power generation unit has a second end protruding toward said first power generation unit; and

15 said first end and said second end are electrically connected with each other by an electrically conductive member extending through at least said electrolyte.

20 8. A fuel cell according to claim 7, wherein said first and second ends have overlapping portions, and at least said electrolyte is interposed between said overlapping portions;

said overlapping portions are connected together by said electrically conductive member; and

25 said electrically conductive member is an electrically conductive rivet member.

9. A fuel cell according to claim 7,
wherein said electrolyte is an electrolyte membrane;

5 said power generation units are arranged in a same plane to form an MEA unit; and

10 said fuel cell further comprises first and second electrically insulating separators for sandwiching said MEA unit;

15 a fuel gas flow field facing said power generation units is provided on said first electrically insulating separator; and

20 an oxygen-containing gas flow field facing said power generation units is provided on said second electrically insulating separator.

25 10. A method of producing a fuel cell including a plurality of power generation units arranged in a same plane, said power generation units each including first and second electrodes, and an electrolyte interposed between said first and second electrodes, said power generation units including a first power generation unit and a second power generation unit adjacent to said first power generation unit, said method comprising the steps of:

30 attaching a first electrically conductive film on a porous electrically conductive film;

35 providing said first electrode of said first power generation unit and said first electrode of said second power generation unit;

40 electrically connecting said first electrode of said second power generation unit and said first electrically

conductive film;

providing a first electrolyte on said first electrode of said first power generation unit and providing a second electrolyte on said first electrode of said second power generation unit such that said first and second electrolytes are partially overlapped on said first electrically conductive film;

10 providing said second electrode of said first power generation unit and said second electrode of said second power generation unit on said first and second electrolytes, respectively;

15 electrically connecting said second electrode of said first power generation unit and said first electrically conductive film through said second electrically conductive film; and

providing a resin insulator on said second electrically conductive film, and in a gap between said second electrically conductive film and said second electrode.

20 11. A method according to claim 10, further comprising the steps of:

electrically connecting a gas diffusion layer of said first electrode of said second power generation unit and said first electrically conductive film; and

25 electrically connecting a gas diffusion layer of said second electrode of said first power generation unit and said second electrically conductive film for electrically

connecting said second electrode of said first power generation unit and said first electrode of said second power generation unit.

5 12. A fuel cell stack comprising a plurality of fuel cells, said fuel cells each including a plurality of power generation units arranged in a same plane and a pair of electrically insulating separators for sandwiching said power generation units, said power generation units each including a first electrode a second electrode and an electrolyte interposed between said first electrode and said second electrode, said fuel cell stack further comprising:

 a casing containing said fuel cells,

10 wherein a plurality of guide grooves are formed on at least one of said separators on a surface opposite to a surface facing said power generation units, for supplying a coolant along said separator; and

15 a coolant passage is connected to said guide grooves of each of said fuel cells in said casing.

20 13. A fuel cell stack according to claim 12, wherein a reactant gas supply passage and a reactant gas discharge passage extend through said fuel cells in a stacking direction of said fuel cells, and said fuel cell stack further comprises a seal member for separating said reactant gas supply passage and said reactant gas discharge passage from said coolant passage.